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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,316	09/16/2003	Chan Young Park	K-0541	1791

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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/662,316	PARK, CHAN YOUNG	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 28 September 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 16, 19-28, 30-31, 34-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 16,19-28,30,31 and 34-42 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 September 2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **September 28, 2005** has been entered.

2. This Office Action is also in response to applicant's amendment filed on September 28, 2005, which has been entered into the file.

3. By this amendment, the applicant has amended claims 16, 19, 22, 27, 30,34-35, 37 and 42 and has canceled claims 17-18, 29, 32-33, and 43-44.

4. Claims 16, 19, 20-28, 30-31, and 34-42 remain pending in this application.

Drawings

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "the optical waveguide comprises a plurality of light guiding cores," recited in **claim 28** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief

description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. **Claims 16, 19-28, 30-31, and 34-42 are rejected under 35 U.S.C. 112, first paragraph,** as based on a disclosure which is not enabling. The *conditions* of having the refractive index of the liquid crystal holographic optical element to be **greater** than the refractive index of the waveguide **and** the light incident on the liquid crystal holographic optical element must be ***greater*** than a *critical angle* in order for the light to be reflected back to the optical waveguide *via total internal reflection* are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). A liquid crystal holographic optical element will not be able to reflect the light back to the waveguide *via total internal reflection* by itself. The conditions set forth above are the *necessary criterions* for the total internal reflection to occur. Furthermore, the claims fail to provide *how* does the hologram of the liquid crystal holographic optical element is *switched* or "selectively *adjustable*" in order for the light to be *reflected back* to the optical waveguide via total internal reflection. The liquid crystal holographic optical element **cannot** cause total internal reflection of

the light. Rather the liquid crystal holographic optical element is being switched to have a uniform refractive index, (i.e. no hologram formed in this state), wherein the refractive index is being *greater* than the refractive index of the waveguide and the when the light incident on the hologram is *greater* than a critical angle, which is determined by refractive indices of both the liquid crystal material and the waveguide, then the total internal reflection can occur at the interface. Total internal reflection means the light does not travel to the liquid crystal holographic optical element at all. The claims also **fail** to teach how does the hologram is **adjusted** to have at least some of the input light to be transmitted through the liquid crystal holographic optical element. The liquid crystal material has to be adjusted to form *refractive index bands*, or *grating structure* with alternative refractive indices in alternative regions, therefore forms a hologram, wherein the refractive indices of the liquid crystal holographic optical element and incident angle of the light do not satisfy the total internal reflection criterions so that the light enters the holographic optical element and is diffracted by the element.

The amendment to the claims (claims 16 and 30) concerning the phrase "a refractive index of the liquid crystal holographic element" does NOT resolve the rejection since by merely claiming the element has certain refractive index DOES NOT give total internal reflection. The applicant is respectfully reminded the criterions for setting up total internal reflection are stated explicitly above.

Claim Objections

8. **Claims 16, 19-28, 30-31, and 34-42 are objected to because of the following informalities:**

(1). The phrase "the liquid crystal holographic optical element comprises at least one hologram that is *selectively adjustable*" recited in **claims 16 and 30** is very confusing and indefinite since it is not clear what are the *physical results* of the "selected adjustment" of the hologram. What are the *functions*

of the hologram as it is being "adjusted"? Since it is not clear what is the function of the "liquid crystal holographic optical element" the scopes of the claims are therefore not clear.

(2). The phrase "a plurality of light guiding cores" recited in claim 28 is confusing and indefinite since it is not clear how does this "plurality of light guiding cores" relate to the liquid crystal holographic optical element.

(3). The phrase "an index of refraction of the liquid crystal holographic optical element in the first state is substantially the same as the index of refraction of the at least one cladding layer" recited in claim 31 is confusing and indefinite since it is not clear how does this feature has anything to do with the device. There lacks logical relationship to make the scope of the claim clear.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 16 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Izumi et al (PN. 5,452,385).**

Izumi et al teaches a *display device* (Figure 5) that is comprised of a *light guide medium* that serves as the *light guiding core* for an *optical waveguide* for *receiving* and *guiding* light (as shown in Figure 5), a set of *first electrode* (43a-43d) positioned on the waveguide, a liquid crystal medium (42) incorporated with a *holographic diffraction grating* (44), that together serves as the *liquid crystal holographic optical element*, positioned on the first set of the electrode and a second set of electrode (45)

positioned on the liquid crystal holographic optical element. The first and second sets of the electrodes defined pixel areas for the display device.

Izumi et al teaches that by applying a non-zero electrical field across the liquid crystal holographic optical element, the liquid crystal molecules will be oriented to be aligned so that a refractive index of the medium or the liquid crystal holographic optical element is set up to be *greater* than the refractive index of the light guiding core (41) so that the light will transmit through the guiding core and reached to the holographic diffractive grating and being diffracted out of the display device, (please see electrode 43c in Figures 5 and 7b). Izumi et al also teaches if *no electrical field* is set across the liquid crystal holographic optical element, the liquid crystal molecules are *not oriented* and effective refractive index of the liquid crystal holographic optical element has a value that is *less than* the refractive index of the light guiding core, the light will then be *totally reflected* at the boundary of the light guiding core (41) and the liquid crystal holographic optical element and being transmitted *only through the core* and not reaching the holographic diffractive grating. In this manner, the holographic diffraction grating is selectively adjustable between the state of having light reached it to be diffracted and a state having no light reached it to be diffracted out of the display device, (please Figures 5, 7a-7c, columns 8-9, transmission mode of the display device is explicitly stated in column 9 lines 50-56).

With regard to claims 24-25, Izumi et al teaches that the voltage or electrical field can be selectively applied across certain electrodes, therefore pixel area, to cause the light to transmit through the area. Since the degree of orientation of the molecules are based on the magnitude of the applied voltage or electrical field, the percentage of the light transmitted through the areas can be adjusted by the magnitude of the electrical field applied.

With regard to claim 26, Izumi et al teaches to use a light source (47) for generating the input light.

With regard to claim 27, the light guiding core (40) has an area that is the same as the effective display area of the display device, (please see Figure 5).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Izumi et al.

The display device taught by **Izumi** et al as described for claim 16 above has met all the limitations of the claim with the exception that this reference does not each explicitly about having a plurality of light guiding cores. However the specification and claims also fail to teach what are the structural and logical relationships between the "plurality of guiding cores" and the display device recited in claim 16, such feature can only be examined in the broadest interpretation. It would certainly having been obvious to one skilled in the art to use more than one of the display device having a light guiding core as shown in Figure 5 to make a larger display device for displaying larger image information.

13. Claims 30-31, and 38-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Izumi et al in view of the patent issued to Rockwell et al (PN. 5,106,181).

Izumi et al teaches a *display device* (Figure 5) that is comprised of a *light guide medium* that serves as the *light guiding core* for an *optical waveguide* for *receiving* and *guiding* light (as shown in

Figure 5), a set of *first electrode* (43a-43d) positioned on the waveguide, a liquid crystal medium (42) incorporated with a *holographic diffraction grating* (44), that together serves as the *liquid crystal holographic optical element*, positioned on the first set of the electrode and a second set of electrode (45) positioned on the liquid crystal holographic optical element. The first and second sets of the electrodes defined pixel areas for the display device.

Izumi et al teaches that by applying a non-zero electrical field across the liquid crystal holographic optical element, the liquid crystal molecules will be oriented to be aligned so that a refractive index of the medium or the liquid crystal holographic optical element is set up to be *greater* than the refractive index of the light guiding core (41) so that the light will transmit through the guiding core and reached to the holographic diffractive grating and being diffracted out of the display device, (please see electrode 43c in Figures 5 and 7b). Izumi et al also teaches if *no electrical field* is set across the liquid crystal holographic optical element, the liquid crystal molecules are *not oriented* and effective refractive index of the liquid crystal holographic optical element has a value that is *less than* the refractive index of the light guiding core, the light will then be *totally reflected* at the boundary of the light guiding core (41) and the liquid crystal holographic optical element and being transmitted *only through the core* and not reaching the holographic diffractive grating. In this manner, the holographic diffraction grating is selectively adjustable between the state of having light reached it to be diffracted and a state having no light reached it to be diffracted out of the display device, (please Figures 5, 7a-7c, columns 8-9, transmission mode of the display device is explicitly stated in column 9 lines 50-56).

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the light guiding core (40) is on a *cladding layer*. However it is rather well known in the art of waveguide to use a cladding layer for enhancing the total internal reflection function of the light transmitting within the waveguide as shown by **Rockwell** et al in an optical waveguide display system wherein the *core guiding layer* (22, Figure 4) is formed on a cladding layer (20 and 24 Figure 4) for

enhancing the total internal reflection of the light at the boundary surface of the core and cladding layer, (please see column 9, lines 23-43). Such modification therefore would have been obvious to one skilled in the art for the benefit of enhancing the light transmission property within the waveguide core layer.

With regard to claims 39-40, Izumi et al teaches that the voltage or electrical field can be selectively applied across certain electrodes, therefore pixel area, to cause the light to transmit through the area. Since the degree of orientation of the molecules are based on the magnitude of the applied voltage or electrical field, the percentage of the light transmitted through the areas can be adjusted by the magnitude of the electrical field applied.

With regard to claim 41, Izumi et al teaches to use a light source (47) for generating the input light.

With regard to claim 42, the light guiding core (40) has an area that is the same as the effective display area of the display device, (please see Figure 5).

14. Claims 16, and 19-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Popovich et al (PN. 6,646,636) in view of the patent issued to Natarajan et al (PN. 6,821,457).

Popovich et al teaches a *display device* having a *light guide* (24, Figures 1, 2A, 6-11) serve as the *light guiding core* of an *optical waveguide* for receiving and guiding light having a *first set of electrode* (40) formed on the waveguide and a *liquid crystal holographic optical element* (32) positioned on the first set of electrode and a *second* set of electrode (40) positioned on the liquid crystal holographic optical element, (please see Figure 4), such that the first and second sets of the electrode defines pixel area for the display device.

Popovich et al teaches by applying different voltage across the liquid crystal holographic optical element the element can be switched to a *diffraction state* (result of a first effective refractive index of the

element) and a *transmission state* (result of a second effective refractive index of the element), such that the light will either diffracted by the liquid crystal holographic element to produce an image or simply passing through the element, (please see Figure 2A).

With regard to claims 19-22, Popovich et al teaches that the a full color image display device can be formed by having liquid crystal holographic element comprises a red, blue and green hologram (96R, 96B, 96G) that each diffracts red, blue and green light respectively. It is implicitly true the pixel associated with the different color hologram is considered to be the red, blue and green sub-pixels.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the liquid crystal holographic optical element is switched to a have a state such that the light is directed back to the waveguide through total internal reflection. **Natarajan** et al in the same field of endeavor teaches a *device* that is comprised of an *optical waveguide* (i.e. the optical contact *substrate* illustrated in Figures 20-26) for receiving and guiding an *input* light, and *a liquid crystal holographic optical element*, having a plurality of *output* holographic optical elements (HOE) each serves as the holograms. Natarajan et al teaches that each of the holographic optical elements (HOE) comprises a *hologram* (18, Figure 1) recorded in a *liquid crystal material* (12) and the liquid crystal material is interposed between *two transparent electrodes*, (14, Figure 1). Natarajan et al teaches that the electrodes are adapted to *selectively* apply a voltage across the hologram of the holographic optical element such that the hologram is selectively adjustable between a *first state* of having all of the incident light *reflects* back to the optical waveguide (Figures 24 and 25), and at least one other state wherein at least some of the incident light *transmits* through the holographic optical element, (Figures 23 and 25). Natarajan et al teaches explicitly that the input light is directed into the waveguide in such a manner that the light strikes the boundaries of the waveguide at an angle greater than critical angle of the substrate or the waveguide so that the incident light is basically trapped within the waveguide by *total internal reflection*, (TIR). When the holographic optical element or the hologram is at first state, no diffraction or any "fan-out"

occurs for the incident light, the light therefore is reflected back to the waveguide via total internal reflection, (please see column 18, lines 24-65). The holographic optical element or the hologram can also be adjusted to at least an other state such that diffraction occurs and some of the light will be diffracted out of the waveguide or transmitted through the waveguide, (please see Figures 19-26, columns 17-20). It would then have been obvious to one skilled in the art to apply the teachings of **Natarajan** et al to modify the liquid crystal holographic optical element of Popovich et al so that the light that is not used to generate the image (i.e. the transmission state) to be reflected back to the waveguide so that the light can be reused to illuminate other pixel and will not be wasted.

With regard to claim 24-25, Natarajan et al teaches that the voltage across the holographic optical elements (HOE) can be adjusted such that all of the light is transmitted through the element and the percentage of the input light being transmitted through the element is controlled by the value of the voltage across the element, (please see column 19, lines 35-62).

With regard to claims 26, it is implicitly true that there is a light source for generating the input light.

With regard to claim 27, the substrate waveguide, (Figures 20-26), serves as the light guiding core and has an area that can be identified as effective display area.

With regard to claim 28, these references do not teach explicitly that the optical waveguide comprises a plurality of light guiding cores. However it would have been obvious to one skilled in the art to combine a plurality of the waveguide with the output holographic optical elements disposed upon it (such as Figure 26) for the benefit of making a larger display device.

15. Claims 30-31, and 34-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Popovich et al in view of the patents issued to Natarajan et al in and Rockwell et al.

Popovich et al teaches a *display device* having a *light guide* (24, Figures 1, 2A, 6-11) serve as the *light guiding core* of an *optical waveguide* for receiving and guiding light having a *first set of electrode* (40) formed on the waveguide and a *liquid crystal holographic optical element* (32) positioned on the first set of electrode and a *second* set of electrode (40) positioned on the liquid crystal holographic optical element, (please see Figure 4), such that the first and second sets of the electrode defines pixel area for the display device.

Popovich et al teaches by applying different voltage across the liquid crystal holographic optical element the element can be switched to a *diffraction state* (result of a first effective refractive index of the element) and a *transmission state* (result of a second effective refractive index of the element), such that the light will either diffracted by the liquid crystal holographic element to produce an image or simply passing through the element, (please see Figure 2A).

With regard to claims 34-37, Popovich et al teaches that the a full color image display device can be formed by having liquid crystal holographic element comprises a red, blue and green hologram (96R, 96B, 96G) that each diffracts red, blue and green light respectively. It is implicitly true the pixel associated with the different color hologram is considered to be the red, blue and green sub-pixels.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the liquid crystal holographic optical element is switched to a have a state such that the light is directed back to the waveguide through total internal reflection. **Natarajan** et al in the same field of endeavor teaches a *device* that is comprised of an *optical waveguide* (i.e. the optical contact *substrate* illustrated in Figures 20-26) for receiving and guiding an *input* light, and *a liquid crystal holographic optical element*, having a plurality of *output* holographic optical elements (HOE) each serves as the holograms. Natarajan et al teaches that each of the holographic optical elements (HOE) comprises a *hologram* (18, Figure 1) recorded in a *liquid crystal material* (12) and the liquid crystal material is interposed between *two transparent electrodes*, (14, Figure 1). Natarajan et al teaches that the electrodes

are adapted to *selectively* apply a voltage across the hologram of the holographic optical element such that the hologram is selectively adjustable between a *first state* of having all of the incident light *reflects* back to the optical waveguide (Figures 24 and 25), and at least one other state wherein at least some of the incident light *transmits* through the holographic optical element, (Figures 23 and 25). Natarajan et al teaches explicitly that the input light is directed into the waveguide in such a manner that the light strikes the boundaries of the waveguide at an angle greater than critical angle of the substrate or the waveguide so that the incident light is basically trapped within the waveguide by *total internal reflection*, (TIR). When the holographic optical element or the hologram is at first state, no diffraction or any "fan-out" occurs for the incident light, the light therefore is reflected back to the waveguide via total internal reflection, (please see column 18, lines 24-65). The holographic optical element or the hologram can also be adjusted to at least an other state such that diffraction occurs and some of the light will be diffracted out of the waveguide or transmitted through the waveguide, (please see Figures 19-26, columns 17-20). It would then have been obvious to one skilled in the art to apply the teachings of **Natarajan** et al to modify the liquid crystal holographic optical element of Popovich et al so that the light that is not used to generate the image (i.e. the transmission state) to be reflected back to the waveguide so that the light can be reused to illuminate other pixel and will not be wasted.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the light guiding core (40) is on a *cladding layer*. However it is rather well known in the art of waveguide to use a cladding layer for enhancing the total internal reflection function of the light transmitting within the waveguide as shown by **Rockwell** et al in an optical waveguide display system wherein the *core guiding layer* (22, Figure 4) is formed on a cladding layer (20 and 24 Figure 4) for enhancing the total internal reflection of the light at the boundary surface of the core and cladding layer, (please see column 9, lines 23-43). Such modification therefore would have been obvious to one skilled in the art for the benefit of enhancing the light transmission property within the waveguide core layer.

With regard to claim 31, the cited references do not teach such feature explicitly however since the claim fails to establish the relevancy of this feature to properly define the metes and bounds of the claim, such feature cannot be examined here. However it is implicitly true that the refractive index of the output holographic optical element in **compared** with the *core layer* satisfies the requirement for allowing total internal reflection of the light to occur at the interface of the element and the core layer.

With regard to claim 38, Natarajan et al teaches that the other state that the holographic optical element is capable of diffracting light is achieved by having a finite voltage across the liquid crystal hologram, (please see Figure 2), but it does not teach explicitly that the first state where no diffraction occurs is achieved by having no voltage across, however such modification really does not change the outcome function of the liquid crystal holographic optical element as explicitly stated above and therefore is not considered as a novel difference rather it is a design choice to one skilled in the art for the benefit of using different voltage settings to achieve the same effect so that is may be suitable for different application requirement.

With regard to claim 39-40, Natarajan et al teaches that the voltage across the holographic optical elements (HOE) can be adjusted such that all of the light is transmitted through the element and the percentage of the input light being transmitted through the element is controlled by the value of the voltage across the element, (please see column 19, lines 35-62).

With regard to claims 41, it is implicitly true that there is a light source for generating the input light.

With regard to claim 42, the substrate waveguide, (Figures 20-26), serves as the light guiding core and has an area that can be identified as effective display area.

Response to Arguments

11. Applicant's arguments with respect to **claims 16, 19-22 and 24-28, 30-31 and 34-42** have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.